



UNITED STATES NAVY

# MEDICAL NEWS LETTER

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Rear Admiral Bartholomew W. Hogan MC USN  
Surgeon General

Captain D. R. Childs MC USN, Editor

Contributing Editors

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Dental Section	Captain W. R. Stanmeyer DC USN
Occupational Medicine	LCDR N. E. Rosenwinkel MC USN
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### Ionizing Radiation

There is present concern regarding hazards of increasing medical, industrial, and military uses of ionizing radiation. That large doses of ionizing radiation are harmful to man is not questioned. The concern is with the day-to-day exposure of the population to small amounts of radiation from these various sources. Positions at the extreme of each side of the question have been taken by some scientists; neither is practical.

The fact that radiation poses a public health problem does not make it unique; it need not result in the almost hysterical statements one reads today. In the area of radiation hazards, methods of control have been, and are being, worked out; the phenomenally good radiation health record of the Atomic Energy Commission is a case in point.

Much of the furor has arisen because of the "fallout" problem. This, first of all, is a political problem. However, the physician, after understanding the dangers from medical sources of ionizing radiation, will have a better understanding of the hazards due to fallout.

The possible kinds and amounts of reaction of penetrating radiation are large, and the result depends not only on the tissue or tissues radiated, but also upon such factors as age, sex, and biologic state of the organism, as well as the species radiated. These complexities are partially responsible for the differing current opinions held regarding hazards from radiation.

The physicochemical interactions at a cellular level result generally in three different kinds of effects when viewed temporally. With a high dose, the acute radiation syndrome may result. Lower doses may result in chronic, delayed, late, or "somatic" effects which may appear months or years after exposure—carcinogenesis and premature death from the "aging" effect of radiation, or an effect on the genetic apparatus.

To understand the present controversy, it is necessary to consider what "threshold effect" is, and most importantly, at what level of dose in the general biologic response to radiation it might occur. For these purposes, interest is centered on low doses of radiation—50 rad down to natural background activity.

In the field of genetics, it is generally conceded that a "no threshold" situation best describes the relation between dose and induced genetic abnormalities. Some reservations are, nevertheless, in order. In the Japanese survivors of the atomic bombings of Hiroshima and Nagasaki, no evidence of an increased rate of malformations in the offspring of radiated persons was demonstrated. In a large New York State study related to variations in background radiation, provocative but unconvincing results have been presented to indicate increased malformations at birth in areas of higher radiation. In general, chronic or intermittent radiation is less effective than the same total dose delivered at a single exposure.

Two delayed or somatic effects have been investigated in great detail, both in experimental animals and in man. A variety of tumors have been

studied, but an increased incidence of leukemia is the most uniform and striking neoplastic result of exposure to radiation in man and in some species of animals. Premature death or "life shortening" of an exposed population of experimental animals and perhaps human subjects is the other outstanding finding. These are the areas in which the controversy rages.

A number of studies have demonstrated without doubt that the risk of leukemia in a human population is increased by exposure to radiation above 50 rad. Several studies with response to small doses have been presented. The most conspicuous effects in this range are apparently on the developing fetus. However, in the present state of knowledge, it can be said that the dose-response relationship below 50 to 100 rad is uncertain in both man and the lower animals and that the relation could be either threshold or non-threshold.

The situation with regard to radiation-induced premature aging in man is even less firmly established than radiation leukemogenesis. Among those receiving relatively large doses—such as radiologists—such effects are statistically impressive. However, in this group, dosage is not known and probably is greater than the current area of interest represented by the threshold controversy. Sufficient studies have not been reported to draw conclusive opinions of the effects of lower dose levels. There is little reason to question the likelihood of a life-shortening effect in man, but its quantitative importance at small doses is open to serious question.

It would be nihilistic to deny the propriety of estimates of risk from small doses based on present scanty knowledge. However, such estimates should be recognized for what they are: "Bad estimates rather than no estimates at all." Sir Macfarlane Burnet has reasoned from present evidence that no more than 10% of "naturally" occurring leukemia is a result of radiation. There is no statistical evidence of an increased rate of leukemia as a result of fallout. In fact, prior to the widespread use of artificially produced radiation, an increase was manifest. Lack of evidence could, of course, mean that present statistics are too unreliable to reveal the small increases which may, in truth, be present. One can derive no comfort from the anonymous or unidentified status of the cases of leukemia or congenital malformations which might be due to small doses of radiation. The comfort, if any, comes from the fact that anonymity could as well be explained at the present time by lack of existence.

It is of final interest to examine the estimated doses of radiation from various sources—background radiation, fallout, and common medical procedures—and compare these with current knowledge of risk for the best quantitated effect in man at larger doses. Many procedures or sources of radiation contribute doses in the region of controversy; some impose much higher doses. The question is a simple one: Is the gain from any of the procedures or sources of radiation less or greater than the risk incurred? No proper medical answer can be given for the political question of fallout.



A general answer for the strictly medical situations can be arrived at. In most instances, it appears that the gain is considerably greater than the risk. To be kept in mind are the relative merits and dangers of alternatives to the use of x-ray for diagnosis or treatment. For instance, what is the risk of surgery or long-term thiouracil treatment of hyperthyroidism, or the use of phenylbutazone in rheumatoid spondylitis as opposed to risk from radiation?

The new general awareness of possible hazards from small doses of radiation only illustrates again that few things in this world are totally good. There is, however, danger of overemphasizing the harmful aspects of radiation. (R.M. Heyssel, G.R. Meneely, Ionizing Radiation: Editorial, Amer J Med, XXIX: 187-192, August 1960)

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### Holes in Rubber Gloves

Twenty-eight years ago, Hunt found that 15 of 28 clean operative wounds contained pathogenic bacteria. Despite recent advances, Wise and associates, in 1959, found 80% of 71 clean surgical wounds to contain pathogenic bacteria. The exact relationship between an infection and the bacterial environment is certainly not known. It appears obvious that operations carried out in a totally sterile environment should not become infected. Yet the converse is certainly not true. Why should a patient develop a staphylococcal infection in a stitch hole which traverses the incision while the main wound heals per primam without inflammatory signs? Many other unexplainable situations exist.

Obviously, nothing should deter the surgeon from making every effort to secure as aseptic a technique as possible, for it is known that bacterial sources must ultimately be the cause of wound infection. One of the most neglected sources of bacterial contamination is the surgeon's gloved hands. It has been amply shown that even the scrubbed hand is redolent with bacteria. The use of rubber gloves has been unquestioningly adopted throughout the world; yet it has been shown that the inner surfaces of only 2% of gloves are sterile when removed, and that bacteria migrate freely through the most minute holes in rubber gloves.

Nevertheless, there are surgeons who suggest that holes in rubber gloves are of little significance, and continue an operative procedure after discovering that a hole has developed.

An instrument has been developed for detection of holes in rubber gloves during an operative procedure. This device is based upon the principle that a rubber glove is an electrical insulator. A very small current of under 5 volts, in the milliamperage range, is interposed in a circuit from the wash basin to the floor. The surgeon, wearing conductive shoes, stands on the floor and the current passes through his body. When he dips his hands into the wash basin,



if there is a hole in the glove, the circuit is completed and is registered on a meter. The meter remains inactive if there is no hole in the glove. Thus, if all members of the operative team repeatedly dip their hands into the basin during an operation, the integrity of their gloves is confirmed.

By use of this device, the authors found a definite percentage of new, unused rubber gloves to contain holes. This suggests that more adequate testing methods are needed in manufacturing gloves, and that standards need to be devised so that surgeons may wear gloves with confidence.

Surgeons must retain a methodology in the surgical scrub which will insure a minimum of contamination if rubber gloves are torn. They must also discard the glove immediately upon discovery of a hole, no matter how small. And, manufacturers of rubber gloves should develop testing methods which will insure the integrity of new gloves. (W. C. Beck, Editorial, Holes in Rubber Gloves: *Amer J Surg*, 100: 363-364, September 1960)

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#### A New Surgical Absorbable Hemostatic Agent

Oxidized regenerated cellulose (Surgicel, Johnson & Johnson) is a new, specifically hemostatic material which is readily absorbed without adverse reaction when left in various body tissues for the purpose of controlling hemorrhage. It is supplied in the form of gauze-like strips or carded fiber pads similar to absorbent cotton.

The special characteristics which make this product useful as an absorbable hemostatic agent arise from the fact that the regenerated cellulose is oxidized to the true chemical compound, polyanhydroglucuronic acid, which, in addition to having hemostatic properties, is soluble in weak alkalis and can be hydrolyzed by living tissues. Such chemical degradation, accomplished by enzymes of the carbohydrase system, contributes to the ease with which the material is absorbed in body tissues and the minimal degree of tissue response occasioned by its implantation. The hemostatic activity of Surgicel probably does not depend upon the physiologic clotting mechanism per se, but on formation of an "artificial clot."

The authors report observations from animal experimentation as well as clinical experience, employing the knitted gauze-like type of fabric. In this form, the material is yellow, light in weight, and silky. The fine-meshed fabric may be applied in a single or double layer as a packing over a flat or curved surface, or as a packing in a cavity or recess. It conforms readily to any contour, no matter how irregular, and may be wrapped easily around tubular structures, such as arterial prostheses. If the operator elects to remove the material when the bleeding has stopped, it does not shred or fall apart, but remains intact. In the authors' experience, in no instance has a wound infection, toxic reaction, or death been attributed to the material.



Drainage for longer than the usual period was encountered in only two instances. Several patients in the series died due to the underlying disease. At autopsy, the material could not be identified grossly in the longer term specimens. However, small flecks of amorphous material could sometimes be detected microscopically in areas of subsiding moderate foreign body reaction.

Two areas stand out sharply as prime examples of outstanding usefulness of this hemostatic material. One is the extensive raw surface left after an extra-pleural pulmonary or mediastinal resection. Secondly, life-threatening loss of blood, due to generalized weeping from the interstices of fabric grafts used to replace aneurysms or to bypass obstructive vascular lesions, has on several occasions been completely controlled by wrapping the graft with Surgicel and briefly holding it in place. The material may be left in situ or removed as desired; but removal is not necessary, and bleeding has occasionally been noted to recur when the material surrounding the graft is unwrapped. The effectiveness of this material in the presence of blood dyscrasias was not investigated in this series. (E.S. Hurwitt, et al, A New Surgical Absorbable Hemostatic Agent: Amer J Surg, 100: 439-446, September 1960)

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#### Risks of Emergency Surgery for Acute Cholecystitis

At the University Hospitals of Cleveland, the authors have believed that a diagnosis of acute cholecystitis demands immediate hospitalization of the patient, but that definitive treatment should be on the ward rather than in the operating room. These patients are admitted to the surgical service in spite of this nonsurgical attitude, for experience with this disease has convinced the authors that its course is not predictable and that a significant percentage of these patients will fail to improve even on intensive medical therapy. Once failure has become apparent, they have not hesitated to operate at any time of day or night on an emergency off-schedule basis.

It was hoped that most patients could be carried through an acute attack of cholecystitis without nonelective surgery; however, it was found that approximately one-third have gone to the operating room as an emergency after medical treatment failed.

The over-all mortality rate of 7% for this group of patients is higher than the average rate of around 3% reported for gallbladder surgery, including both emergency and elective operations, during acute cholecystitis. However, the complication rate of 14% in this group does not differ significantly from that of 15% for acute cholecystitis, in general, experienced at the authors' hospital. While these results do not demonstrate a relationship between age of patient or type of operation and risk of surgery, they do



show a clear-cut relationship between length of illness prior to operation and the risk of surgery. Results indicate a low risk in emergency surgery for patients ill less than 4 days prior to operation, but that the risk rises sharply once this time period is exceeded.

Emergency surgery early in acute cholecystitis appears to be at least as safe as gallbladder surgery, in general, during acute cholecystitis. However, there is no indication in the authors' data that immediate emergency surgery is mandatory in early cases when failure of medical treatment has become apparent. The actual perforation rate of only 1% is of no consequence in these patients, and the minimal risk of possible future perforation should not dictate the course of action. Such patients could well be operated on electively on the next day's regular operating schedule as long as the 3-day period of relative safety is not exceeded.

Twenty-nine patients ill for 4 or more days prior to surgery were particularly poor operative risks, accounting for 7 of the 9 total deaths and 10 of 16 major complications in the group of 123 patients. Deaths which followed surgery in these cases were all caused by associated cardiovascular and pulmonary diseases which were at best only accentuated by acute cholecystitis. Primary attention should be directed to the extra-biliary tract problems of such patients. Emergency operation, especially "last ditch" emergency surgery, should not be attempted even if such patients fail to respond to conservative therapy. If operation is ever considered mandatory, it should be limited to planned delayed elective cholecystostomy only after concurrent medical problems have been resolved satisfactorily. (H. K. Wright, W. D. Holden, The Risks of Emergency Surgery for Acute Cholecystitis: Arch Surg, 81: 341-347, September 1960)

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#### Hazards of Anesthesia for Diagnostic Procedures

As therapeutic scope broadens, the need for diagnostic accuracy increases. The diagnostician no longer is content to obtain such accuracy by merely inspecting, palpating, or auscultating the body shell. Now, he must literally probe the very core by cutting, injecting, sampling, and "scoping" through body orifices, natural and otherwise. The patient, as eager as the physician to arrive at the proper diagnosis, will tolerate these probings if he can undergo them without too much discomfort. The diagnostician turns naturally to his colleague in anesthesia for provision of analgesia, amnesia, quiescence, or whatever condition may be necessary to make the procedure in question tolerable to the patient. But, for some procedures, anesthesia may be hazardous.

Obviously, patients who undergo diagnostic procedures have, or presumably have, some physical disability. The condition may or may not contribute to an element of hazard in relation to diagnostic procedures.



The patient must be prepared as he would be for any operative procedure or for anesthesia, and disastrous complications must be anticipated.

There is a tendency on the part of anesthetists to minimize the importance of details in a minor procedure. Hence, the patient's ability to tolerate anesthesia and the diagnostic procedure may not be as carefully assessed, or the patient as carefully prepared as would be the case prior to a more formidable therapeutic procedure. Many diagnostic procedures are long and tedious and a sense of achievement may not be realized. Accordingly, under such circumstances the responsibility for anesthesia may be relegated to the least experienced person available or, even if assigned to an experienced person, it may be carried out in an indolent manner. Only preparedness and rigid adherence to the axiom that there is no such thing as minor anesthesia will dispel this attitude.

To correct the situation, something of the pathophysiologic aspects of the disease under investigation must be learned. The requirements of the procedure itself must be learned in order to provide conditions necessary for its successful completion. Care must be taken to see that areas in which the diagnostic procedure are to be done, equipment to be employed, and the anesthetist assigned are comparable to those considered necessary and proper in the operating room. Anesthetists should be mindful of the fact that diagnostic procedures will not diminish in number or become less complicated as time goes on; the trend is, in fact, in the opposite direction. Responsibilities in the field are going to increase. (R. T. Patrick, Editorial, The Hazards of Anesthesia for Diagnostic Procedures: *Anesthesiology*, 21: 553-554, September - October 1960)

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#### Identification of True Pathogens of the Urinary Tract

Infections of the urinary tract are among the most frequently encountered, most frequently treated by trial and error, and most difficult to manage.

In chemotherapy of urinary tract infections, the anatomical location of the infection—although important—is second to the causative agent, the duration of the infection accompanying complications, and capacity of the invading pathogen to mutate. In diagnosis and management of chronic infections, it is of real importance to know not only the taxonomic classification of the pathogen, but also the susceptibility pattern.

The most serious of these infections is pyelonephritis, either sub-clinical, acute, or chronic. Chronic infections of the lower urinary tract are less acute but more frequent. Chronic cystitis and urethritis are difficult to manage, as is chronic prostatitis. Despite the importance of this group of diseases, the clinical diagnosis of infection of the urinary tract is



made in only 20 to 30% of those who are found to have active pyelonephritis at autopsy, and the diagnosis is missed about as often in massive pyelonephritis as in those with minor incidental lesions. Nevertheless, a body of medical literature is accumulating which suggests that urinary infection is being overdiagnosed because of contamination at the time of sample collection.

There is no substitute for culture, and no positive culture should be ignored. The urine is an excellent medium for growth of most bacteria which do not need enrichment. It should be immediately cultured soon after it is excreted by the tubules, and certainly soon or immediately after it is collected. Secondary subculture is often necessary. If the patient is under therapy, it is also advisable to neutralize sulfonamide by p-aminobenzoic acid, penicillin with penicillinase, et cetera.

Culture of the urine is assuming greater importance since the intensive use of chemotherapy has given rise to mutagenic variants of pathogens which have become drug-resistant. This becomes essential in cases where the patient has a chronic infection which has been frequently subject to repeated chemotherapy with or without accompanying complications, such as urinary obstruction, calculus, stricture, diverticula, indwelling catheter, or frequent catheterization. These patients are usually in environments where pools of drug-fast organisms are constantly present, and where they may acquire these organisms even though strict antiinfective or anticontagious precautions are observed.

The authors describe their technique of culture and sub-culture which seemed to effectively identify true pathogens of the urinary tract, particularly those which were occult. In their experience, approximately one out of every four pathogens (28%) were missed by the first culture. Gram-positive cocci, Micrococcus, and enterococcus were commonly missed on first culture; the next most often missed was Escherichia. (H. Seneca, O.K. Troc, P. Peer, Identification of the True Pathogens of the Urinary Tract - Criteria and Methods: J Urol, 84: 499-503, September 1960)

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### Antidepressive Medications

Depression is one of man's most common ailments, especially if it includes the many mild nervous disorders in which depressive symptoms occur. Physicians have long sought medical remedies for symptoms of depression—even back to the day when Hippocrates regarded "melancholia" as arising from an excess of black bile.

#### Antidepressive Agents and Depressive Disorders

A number of compounds with limited value have been in use for years, but only in the last 2 years have antidepressive agents been developed intensively. An antidepressive drug is considered one which relieves depressive



symptomatology, whether through stimulation of the central nervous system or through sedative effect.

A depressive disorder may be a short-lived episode of mild anxiety and depression due to a personal loss or period of stress; or it may be frequently recurring or persistent and may become a depressive illness. No satisfactory classification has been defined, although it is common practice to divide the more serious depressive disorders into the agitated and the retarded types.

Beyond this over-all division, the official classification of the American Psychiatric Association subsumed all depressive reactions under: (1) manic-depressive reaction, depressed type; (2) psychotic depressive reaction (often similar to the first type, but with no history of the manic phase or alterations of mood); (3) involutional psychotic reaction; and (4) psychoneurotic depressive reaction.

The first three disorders are regarded as psychoses, while the fourth covers the numerically greater "neurotic" depressions. A depressive symptomatology also may be associated with other psychiatric disorders, including schizophrenia, organic reactions, and various psychoneuroses.

#### Mechanisms of Action of Antidepressants

The great variation in depressive symptoms and syndromes makes it obvious that a medication that helps one patient may not help another. Thus, in addition to understanding the implications of the patient's symptoms, the physician must be familiar with the mechanism of action of antidepressant drugs.

Most antidepressant agents are thought to exert a stimulating effect on the central nervous system through direct action of the drug itself, through an indirect action by means of an accumulation of neurohumoral substances, or through both of these actions.

Present evidence indicates that at least two enzymes are responsible for the in vivo catabolism of brain amines. While an o-methylating enzyme seems important in part, the deaminating action of monoamine oxidase has been considered even more significant in the breakdown of the neurohumoral amines such as norepinephrine and serotonin. When the enzyme monoamine oxidase is inhibited, the brain levels of various amines rise. Such increments in amine levels, demonstrated in diencephalic areas of brains of animals, have been associated with behavioral signs of increased activity. However, activation by amines of such "ergotropic" regions of the mesencephalon has not yet been demonstrated in man. It is believed, nevertheless, that portions of these ergotropic areas serve as central headquarters for the sympathetic nervous system. Activation of these areas has been suggested as at least one of the modes of action of the monoamine oxidase (MAO) inhibitors.

In addition to stimulating the central nervous system directly and indirectly, some agents are thought to increase central nervous system activity



by increasing the available amount of cholinergic neurohumoral transmitter substance. In fact, deanol—one agent used to increase central activity—is thought to be a precursor of acetylcholine, thus theoretically reinforcing central cholinergic excitation.

Other antidepressive agents produce apparently beneficial clinical results through their suppressant properties. Conceivably, their mechanism of action could involve a release phenomenon similar to that produced by alcohol. Other sedative drugs and tranquilizers may act through the hypothalamus to control the anxiety aspect of depression.

Finally, agents like imipramine—while possessing sedative properties—may sensitize receptors to transmitter substances much as cocaine sensitizes receptors to the action of epinephrine.

### Tentative Classification

#### Central Nervous System Stimulants

Predominantly Direct Stimulants. These substances—moderate and minimal sympathomimetics—are direct stimulants with the following characteristics:

1. Stimulation of the nervous system directly, with little or no monoamine oxidase inhibition.
2. Rapid and brief action, possibly followed by letdown.
3. Tendency to hypertensive effect, moderate sympathomimetic agents.
4. Tendency to reduce appetite.
5. Relative nontoxicity.
6. Tendency to habituation or dependency.

Amphetamines—moderate sympathomimetics—because of brevity of action and side effects have had limited use in controlling depression. On the other hand, their promptness of action and relative safety have earned them a position in the physicians' resources of psychotherapeutic drugs.

Methylphenidate and pipradol—minimal sympathomimetics—appear to have significantly milder sympathetic side reactions while retaining the stimulating effect on the central nervous system of older amphetamines.

None of the direct central nervous system stimulants have proved to be really effective, however, in treating severe depressions. These agents may, in fact, aggravate agitation, tension, and especially, insomnia.

Bimodal Stimulants. Tranylcypromine, a nonhydrazine not yet commercially available, has a bimodal action. It rapidly achieves direct stimulating effects, but also exhibits the slow cumulative action of other monoamine oxidase inhibitors.

Predominantly Indirect Stimulants. A. Monoamine oxidase inhibitors—These agents have the following distinguishing characteristics:



1. Action is believed to be mediated by monoamine oxidase inhibition or related phenomena; or possible slight direct central nervous system stimulating activity.

2. Stimulating action is slow in onset, prolonged, with a tendency to be cumulative, and with no subsequent letdown.

3. Postural hypotension occurs frequently.

4. Appetite is increased, constipation is common.

5. Troublesome side reactions occur in relatively high incidence.

6. There is no apparent tendency to habituation or dependency.

Ipreniazid—the first of the group to be used—proved to be of value in many depressive disorders, although it has a tendency to produce toxic liver damage. Its use has been restricted largely to patients resistant to electroshock therapy. It has now been almost completely superseded by the four new MAO inhibitors (pheniprazine, isocarboxazide, phenelzine, nialamide) which became available in 1959, and appear to be faster acting, safer, and more potent. The MAO inhibitors have a definite place in present psychiatric therapy, but their use demands close medical supervision.

B. Cholinergic reinforcers—Another type of indirect stimulant, deanol is considered to act by cholinergic reinforcement. Presumably a precursor of acetylcholine, it appears to produce a stimulating effect that is more natural or physiologic than the action of many other agents. It does not appear beneficial for seriously depressed psychotic patients, but in milder cases, may be helpful; it does not entail serious dangers or many disturbing side effects.

Central Nervous System Suppressants. A. Barbiturates and other sedative drugs—Nonstimulants may be useful in treating depressive disorders; much of the symptomatology can be relieved by sedation. If the anxiety which accompanies most depressive disorders can be relieved by the central nervous system depressant, the patient's condition may improve. In severe or psychotic depressions, sedatives usually give only transient help.

B. Certain major tranquilizers—Phenothiazine drugs with lower brain centers as their principal sites of action, have also been used in treating depressive disorders, but without uniform success. They may relieve severe agitation or paranoid and schizoid symptomatology sometimes associated with psychotic depressions. In toxic doses, they may bring about a lifting of the depression, but only with great risk and entailed close supervision.

Antidepressive activity has been claimed for phenothiazines of the piperazine and piperadyl series—trifluoperazine and thioridazine; they are "stimulating" in the sense that they can produce signs of motor restlessness.

C. Minor Tranquilizers—These agents, meprobamate and benactyzine, may be useful in mild depression. A newly released tranquilizer, methaminodiazepoxide (Librium), also appears to have antidepressive activity and is recognized as a broad-spectrum suppressant.

D. Imipramine—This agent is difficult to classify. It does not appear to stimulate the central nervous system directly, nor is it a monoamine oxidase inhibitor. Some workers believe that its effects are produced by sensitizing central adrenergic mechanisms at synaptic junctions. In addition to the possibility that it selectively affects some subcortical structures, its slow smooth action without appreciable interference with cortical function may add to its usefulness as an antidepressive agent.

### Principles of Clinical Application

Type to be Used. Choosing the most suitable antidepressive drug for the individual patient is not easy. This is not surprising since a given psychopathologic matrix may give rise to a variety of clinical symptoms. Furthermore, many depressive disorders—particularly in individuals with basically strong personalities—are self-limiting. True evaluation of the results of therapy is difficult.

Decision as to the drug to employ must be based on nebulous "clinical judgment." However, a few general precepts may be presented. In mild cases, the simplest—and safest—rule is to make the first therapeutic trial with a sedative type of minor tranquilizer, particularly if the patient has insomnia and appears tense and restless. On the other hand, if there is retardation and indecisiveness, a stimulating compound, such as deanol or an MAO inhibitor, may be indicated. If agitation is predominant, stimulating drugs are not tolerated; a suppressant agent such as imipramine will be required. Depressed patients with ideas of self-reference, suspicions, or severe compulsions and fears are usually psychotic and should be referred to a psychiatrist. In the meantime, imipramine or one of the MAO inhibitors, frequently in combination with a phenothiazine derivative, may be of value.

Some fortunate people are helped by the first drug used. Others are not helped by any, but do respond to electroshock therapy. If one drug or combination of drugs fails to help, another preparation—particularly from a different class of compounds—may succeed.

Dosage. As with tranquilizing drugs, individual tolerance for the antidepressive agents varies widely. The dosage range recommended by the manufacturer is generally a good initial guide; later, the patient's individual needs and tolerance may necessitate adjustments as determined by degree of symptomatic relief and side reactions. Most antidepressive agents act slowly so that a trial of 3 to 4 weeks is often necessary. If an effective compound has been found, the medication should be continued for several weeks or even months beyond appearance of maximal symptomatic relief. Relief needs to be maintained until the patient's recuperative processes have had time to operate. Antidepressive medications, by themselves, do not effect a cure; most patients will need other assistance. (B.C. Schiele, W.M. Benson, *Antidepressive Medications: Postgrad Med*, 28: 101-111, August 1960)



### Carotid Sinus Syndrome

The carotid sinus syndrome may be defined as the occurrence of spontaneous symptoms precipitated by a hypersensitive carotid sinus reflex. Appropriate stimulation of the left or right carotid sinus will induce detectable circulatory change in many subjects. The extent of such changes varies widely with the subject and with the technique of stimulation. It is essential to differentiate the clinical syndrome from simple hyper-reactivity of the carotid sinus reflex which may be present without causing symptoms.

The authors describe 16 patients in whom the diagnosis was established over a 2-year period. Their observations emphasize the wide variety of clinical manifestations of the syndrome.

The technique for eliciting the reflex requires care and special attention. Because the fall in blood pressure may be considerable, the patient should be recumbent. With the neck relaxed and the head turned slightly to the opposite side, the sinus is massaged, one side at a time, exercising care to avoid obstructing the carotid blood flow. Simultaneous auscultation of the heart is essential; as soon as cardiac standstill, abrupt slowing, or sudden pallor occurs, stimulation of the sinus is stopped. When the patient has spontaneously confirmed that the premonitory symptoms of the more florid attacks have been exactly reproduced, the authors have been content to accept the diagnosis without seeking to stimulate the sinus further and produce more severe attacks.

### Clinical Findings

All of the 16 patients were male, aged 48 to 82, and most had some hypertension. The right sinus was affected in 14, the left in 2. Although the pattern of attack tended to be stereotyped, there was considerable overlap in symptomatology. A striking feature of many was the dramatic and abrupt first onset of symptoms, the initial episode being often the most severe and the longest.

Vertigo. True vertigo was the symptom most often encountered. It was unassociated with nausea or vomiting, tinnitus, or perceptive deafness. Attacks were usually brought on by turning the head to one side (usually the right) or by flexing or extending the neck.

Syncopal Attacks. The attacks usually began with transient faintness followed by loss of consciousness. Sudden pallor at the onset followed by flushing during recovery was often described by onlookers. Two patients of the authors' series had convulsive movements during an attack; one was incontinent of urine and therefore diagnosed as epileptic.

Focal Attacks. Attacks of motor or sensory disturbances in the limbs were the main feature in 3 patients. In each case, carotid sinus stimulation produced cardiac standstill or slowing with hypotension, followed immediately

by a typical attack. Two patients complained of unilateral sensory disturbance in an arm and leg; the third developed clonic movement of the right upper limb.

Mental Changes. Mental changes were the most prominent feature in 2 patients. In one, recurrent syncopal attacks were followed by mental confusion lasting several hours. The other became permanently demented after prolonged cardiac standstill, illustrating the danger of these attacks.

### Circulatory Changes in Attacks

In 13 patients evaluated, carotid sinus stimulation induced both disturbance of the heart rhythm and a sharp fall in the mean arterial pressure and pulse pressure. The changes fell conveniently into three groups according to the mechanism of cardiac slowing: ventricular standstill, sinus bradycardia, and auricular standstill. The broad pattern of behavior of the blood pressure was closely similar in the three groups. This consisted of an abrupt fall in blood pressure and pulse pressure, and slow return to normal. The change was considered to be due to an associated fall in peripheral vascular resistance or reduced cardiac output.

### Treatment

Medical treatment consists in giving anticholinergic or sympathomimetic drugs to block the circulatory effects of the reflex. The authors have found belladonna the most useful drug. The appropriate dose varies from patient to patient, but it should cause perceptible dryness of the mouth. It is usual to recommend avoidance of tight neckwear. However, in the authors' series, many patients could induce symptoms by turning their heads to one side without any constricting collar.

In severe cases, the most satisfactory form of treatment is surgical denervation of the affected sinus. If the onset is sudden and the history short, operation should be deferred, even though the symptoms are severe, because spontaneous remission may occur. However, risk of irreversible damage during a prolonged syncopal attack as well as development of symptoms that may occur when driving a car, must be kept in mind in relation to consideration for surgery. (E. C. Hutchinson, J. P. P. Stock, *The Carotid-Sinus Syndrome: The Lancet*, II (7148): 445-449, August 1960)

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Worry affects the circulation, the heart, the glands, the whole nervous system, and profoundly affects the health. I have never known a man who died from overwork, but many who died from doubt.

—Charles Mayo



### Incidence of Notifiable Diseases

Certain trends in occurrence of notifiable diseases are indicated by statistics presented in Morbidity and Mortality (Annual Supplement, September 16, 1960), a weekly report prepared by the National Office of Vital Statistics of the Public Health Service, Department of Health, Education, and Welfare. Facts concerning a few of the more significant diseases are presented.

Poliomyelitis. Reported incidence of poliomyelitis in 1959 was 46% higher than in 1958, but the number of paralytic cases was 70% greater than for the previous year. The number of nonparalytic cases increased only 5%. The larger proportion (75%) of paralytic cases in 1959 compared to 64% in 1958 is probably due to the fact that there is an increasing reluctance to report nonparalytic poliomyelitis without confirmatory laboratory examinations. In spite of the considerable increase in paralytic poliomyelitis in 1959, its occurrence was predominantly a series of localized outbreaks mainly in the lower socioeconomic sections of urban areas. The size of the localized outbreaks varied from a few to a hundred cases. The largest occurred in Kansas City, Mo.; Des Moines, Iowa; and Little Rock, Ark.

Hepatitis. The reported incidence of hepatitis was 44.7% higher in 1959 than in the previous year. The increase was apparent for all geographic divisions of the country and in about three-fourths of the States. Most States that did not report an increase had totals that were not far below those for 1958. This disease appears to be occurring in cycles, the last peak of which was in 1954. The low point of the cycle was reached in 1957, followed by an increase of reported cases in 1958 and again in 1959. During the years, 1952 to 1958, inclusive, the number of deaths from infectious hepatitis, which is exclusive of those certified as due to homologous serum hepatitis, has been between 800 and 900 per year. There is no explanation for the fact that numbers of cases which include homologous serum hepatitis show a cyclic type of occurrence while deaths from infectious hepatitis have remained relatively constant from year to year.

The large number of cases reported and the number of deaths mark this acute infectious disease as a major public health problem.

Venereal Diseases. In 1959, State health departments reported 14.6% more cases of early syphilis than in 1958 and 5% more cases of other forms of syphilis. Furthermore, the Venereal Disease Branch of the Communicable Disease Center reports that primary and secondary syphilis increased 26.4% in 1959. The increase in primary and secondary syphilis accounts for most of the increase in early syphilis shown in the table.

Tuberculosis. In 1959, there were 75,484 newly reported tuberculosis cases in the U.S., nearly 10% less than in 1958 and about 25% less than 5 years ago. Slightly over three-quarters of the new cases reported were active and probably active—cases that require the closest attention.

## REPORTED CASES OF SPECIFIED NOTIFIABLE DISEASES: UNITED STATES, 1950-59

(Figures include Alaska for 1959 but not for prior years and exclude Hawaii for all years. Numbers after diseases are category numbers of the Seventh Revision of the International Lists, 1955)

DISEASE	1959	1958	1957	1956	1955	1954	1953	1952	1951	1950
Amebiasis-----046	3,508	4,380	5,031	3,689	3,348	3,523	4,444	4,280	3,550	4,568
Anthrax-----062	12	16	26	38	39	22	45	47	60	49
Botulism-----049.1	20	6	28	17	16	18	18	18	33	20
Brucellosis (undulant fever)-----044	892	924	983	1,300	1,444	1,823	2,032	2,537	3,139	3,510
Dengue-----090	-	-	-	2	1	6	8	5	16	26
Diphtheria-----055	934	918	1,211	1,568	1,984	2,041	2,355	2,960	3,983	5,796
Dysentery, bacillary (shigellosis)-----045	12,888	11,861	9,822	10,306	13,912	13,846	16,533	23,197	32,215	23,367
Encephalitis, acute infectious-----082	2,437	2,587	2,135	2,624	2,166	2,606	1,935	1,912	1,123	1,135
Hepatitis, infectious, and serum-----092, N998.5 pt.	23,574	16,294	14,922	19,234	31,961	50,093	33,700	17,428	7,349	2,820
Leprosy-----060	44	39	36	52	75	56	60	57	57	44
Leptospirosis-----072	83	55	47	44	24	48	42	62	9	30
Malaria-----110-117	71	85	132	234	522	715	1,310	7,023	5,600	2,184
Measles-----085	406,162	763,094	486,799	611,936	555,156	682,720	449,146	683,077	530,118	319,124
Meningococcal infections-----057	2,180	2,581	2,691	2,735	3,455	4,436	5,077	4,884	4,164	3,788
Plague-----058	4	-	1	1	-	-	-	-	1	3
Poliomyelitis-----080	8,425	5,787	5,485	15,140	28,985	38,476	35,592	57,879	28,386	33,300
Paralytic-----080.0, 080.1	6,289	3,697	2,499	7,911	13,850	18,308	15,648	21,269	10,037	---
Nonparalytic-----080.2	2,045	1,941	2,826	6,555	12,453	13,221	12,144	12,802	5,470	---
Unspecified-----080.3	91	149	160	674	2,682	6,947	7,800	23,808	12,879	---
Psittacosis-----096.2	147	158	278	568	334	563	169	135	25	26
Rabies in man <sup>2</sup> -----094	6	5	5	10	4	13	12	24	18	18
Rabies in animals <sup>3</sup> -----	4,177	4,787	4,542	5,681	5,799	7,297	8,903	8,445	8,008	7,901
Rocky Mountain spotted fever-----104 pt.	199	243	240	293	295	294	313	327	347	464
Salmonellosis, except typhoid fever-----041, 042	6,606	6,363	6,693	6,704	5,447	5,375	3,946	2,596	1,773	1,233
Scarlet fever and streptococcal sore throat-----050, 051	334,715	264,097	226,973	176,392	147,502	147,785	132,935	113,677	84,151	64,494
Smallpox-----084	-	-	41	-	42	49	4	21	11	39
Tetanus-----061	445	445	447	468	462	524	506	484	506	486
Trichinosis-----128	227	176	178	262	264	277	395	367	393	327
Tuberculosis, all forms-----001-019	75,484	82,266	86,861	90,465	98,860	100,540	106,925	109,837	118,491	121,742
Tularemia-----059	459	587	601	522	584	681	601	668	702	927
Typhoid fever-----040	859	1,043	1,231	1,700	1,704	2,169	2,252	2,341	2,128	2,484
Typhus fever, endemic (murine)-----101	51	71	113	98	135	163	221	205	378	685
Venereal diseases: <sup>5</sup>										
Gonorrhea-----030-034	240,071	241,792	222,048	233,593	244,279	249,683	246,311	253,839	254,057	286,746
Syphilis-----020-029	120,703	115,173	136,039	131,763	123,004	131,260	150,026	169,198	174,924	217,558
Other specified venereal diseases-----036-038	2,403	2,454	2,519	3,147	4,078	4,650	5,209	6,093	6,885	8,187
Whooping cough (pertussis)-----056	40,005	32,148	28,295	31,732	62,786	60,886	37,129	45,030	68,687	120,718

<sup>1</sup>Delayed report of a case in Texas.

<sup>2</sup>For 1950-58, figures represent registered deaths.

<sup>3</sup>For 1950 and 1951, figures from Agricultural Research Service, U.S. Department of Agriculture.

<sup>4</sup>These cases do not fulfill the generally accepted criteria for a diagnosis of smallpox.

<sup>5</sup>For 1950 and 1951, figures (civilian cases only) from the Venereal Disease Program, Public Health Service.



### Improved Composition of Medical Corps

Since 1954, the composition of the Medical Corps strength has shifted from about 38% Regular and 62% Reserve to 60% Regular and 40% Reserve. This shift has produced many beneficial results for the Medical Corps, including a drastic reduction in annual turnover. Where it was once necessary to replace from 1300 to 1500 physicians each year, the present annual turnover is only 600 to 800. The vast majority of physicians in today's Medical Corps remain in service decidedly longer than 2 years, and the career potential of the Medical Corps has substantially improved since 1954.

The change in Medical Corps composition was brought about through positive action which resulted in:

1. Career Incentive legislation, to improve service attractiveness,
2. The Senior Medical Student Program, to provide an annual input of career-motivated Regular Navy Medical officers,
3. Improvement of the Navy's teaching programs, to offer Navy physicians the finest professional training available.

The result of these programs is a more stable, career-motivated Medical Corps. Increased stability of the Corps has made possible less frequent changes of duty, resulting in higher Corps morale. This stabilizing effect plus the fact that today's training programs result in a better trained Medical Corps have been reflected in terms of finer and more complete medical care for all naval personnel.

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### CAPT Hedblom Receives Secretary of Navy Commendation

CAPT Earland E. Hedblom MC USN was recently presented a Secretary of the Navy Letter of Commendation with Commendation Ribbon and Metal Pendant, in recognition of "outstanding performance of duty from 2 May 1955 to 14 April 1959, while serving as Staff Medical Officer, U. S. Naval Support Force, Antarctica." The Citation reads, in part: "Exercising unusual professional skill and resourcefulness, CAPT Hedblom planned the medical spaces and designated the medical supplies and equipment for the seven U. S. Antarctic bases of the International Geophysical Year. His collected statistics form the basis for planning of practical polar medical facilities and for the present criteria in physical and psychiatric examination of polar personnel. Among his many other accomplishments, CAPT Hedblom perfected a dark glass for protection from glare and snowblindness; improved the polar survival ration; designed and constructed lighter shrink-proof parkas, pants, and balaclavas; and trained personnel in polar medicine and safety precautions."

CAPT Hedblom is Head of the Department of Cold Weather Medicine at the U. S. Naval Medical School, National Naval Medical Center, Bethesda, Md.

He was recently appointed as medical consultant to the Arctic Institute of North America. Also, he is Medical Advisor to Operation Deep Freeze, and Cold Weather Medicine Advisor to the Commandant, U.S. Marine Corps.

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Annual Meeting of American Academy  
of Dermatology and Syphilology

The American Academy of Dermatology and Syphilology will conduct its annual meeting at the Palmer House, Chicago, Ill., 3 - 8 December 1960. The afternoon of 5 December will be devoted to a two and one-half hour round table panel on Military Dermatology presented by members of the Armed Forces. Subjects to be presented will include "Medical Aspects of Missile Operations," "Medical Investigation of Aircraft Accidents," and "The Medical Problems of a Nuclear Disaster and the Concepts of Resolution." A short discussion period will follow each presentation.

Eligible inactive Naval Reserve Medical officers may earn one retirement point credit for attendance at this panel provided they register with the military representative present.

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BUMED INSTRUCTION 1416.1C SUP-3

23 September 1960

Subj: Specified courses of instruction as requirements for active-duty officer promotion; suspension of

This directive announces the suspension of requirements for mandatory completion of specified courses of instruction for the determination of professional fitness for promotion of Medical Department officers and warrant officers on active duty.

BUMED NOTICE 6230

30 September 1960

Subj: Influenza vaccination program for 1 October 1960 to 31 July 1961; delay in

Procurement delays will prevent complete fulfillment of the Navy's total vaccine requirements prior to 1 November 1960. Requisitions will be filled by appropriate depots as rapidly as stocks become available. All Ships and Stations shall modify immunization schedules to conform to the revised availability of Influenza Vaccine.



BUMED INSTRUCTION 6240.5

22 September 1960

Subj: Bacteriological Examination of Water (DD Form 686)

This directive prescribes the use of revised DD Form 686. This form shall be used by all facilities of the Navy when bacteriological examinations of water are made. The revised form supersedes the present DD Form 686 and shall be used upon depletion of existing stocks.

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From the Note Book

Armed Forces Medical Journal to be Discontinued. The Editors regret to announce that the United States Armed Forces Medical Journal will cease publication with the December 1960 issue, completing Volume 11. The Journal, one of the results of various policies related to unification of the Armed Forces, is being discontinued following a decision by the Secretary of Defense. In 1950, the Armed Forces Medical Journal replaced the Naval Medical Bulletin, a publication which had been published without interruption since 1907.

Physiologic Measuring Devices for High Altitudes. Considerable progress has been made by Medical Department research in the program to provide adequate physiologic measuring devices which will be worn by aviators flying high performance test aircraft in various missile evaluation studies being conducted on the Pacific Missile Range, Point Mugu, Calif. Respiratory rate, temperature, electrocardiograms, electroencephalograms, et cetera, will be recorded on pilots for experimental purposes in order to better determine stresses imposed on them while on maneuvers and to provide better safety surveillance. Miniature instruments which will be easily worn by pilots have been perfected for these purposes.

Nuclear Power Reactor at McMurdo Sound. In view of plans to install a nuclear power reactor at the Naval Air Facility, McMurdo Sound, Antarctica, the Flight Surgeon assigned to this billet must be nuclear trained. A graduate of the December 1960 class at the Naval School of Aviation Medicine will be nominated for the necessary nuclear training and subsequent assignment to McMurdo in Fall 1961.

"Muscle as a Tissue" Conference. The Surgeon General of the Navy has announced that CAPT R. H. Brown MC USN, Commanding Officer of the U. S. Naval Hospital Bethesda, Md., and LCDR R. B. Gresham MC USN, U. S. Naval Medical School, Bethesda, will represent the Navy Medical Department at the International Research Conference on "Muscle as a Tissue" to be held

in Philadelphia, 3 - 4 November 1960. The Navy representatives will join approximately 400 other physicians and scientists associated with muscle chemistry, physiology, and function in discussing new advances and concepts in this field. The conference will be similar to one held in Philadelphia two years ago which discussed "Bone as a Tissue." (TIO, BuMed)

FDA Wants Label Reforms for Dihydrostreptomycin. Food and Drug Administration has proposed stricter labeling requirements for dihydrostreptomycin drugs because of possible auditory damage. FDA says impairment or total deafness can result from use of a much smaller amount of the drug—or its use for a shorter period—than formerly was believed necessary to cause damage. They propose requiring the label to read: "Warning—For use only in patients who can not tolerate streptomycin." (Washington Report on the Medical Sciences, October 3, 1960)

Alcohol and Gastric Secretion. Although studies by the authors fail to identify the mechanism of increased gastric secretion resulting from alcohol ingestion, they do indicate that the secretion is not the result of a general histamine release, antral gastrin release, or nerve reaction. Other mechanisms are suggested and are being studied. (W. Irvine, et al, Gastroenterology, July 1960)

Corticoids and Gastric Secretion. From studies on dogs, the authors conclude that a secretagogue action of cortisone on the gastric mucosa has not been demonstrated. They suggest that corticoids act as homeostatic agents on the stomach, and that production of "stress ulcer" may be through anti-phlogistic activity. (R. Wiederanders, et al, Ann Surg, July 1960)

Eye Injuries Due to Power Lawn Mowers. The authors report 5 cases of eye injuries occurring over a 4-year period due to the projectile effect of power lawn mowers. In 3 cases, vision was totally lost. The need for safety features in the rotary type power lawn mower is stressed. (D. Barsky, Arch Ophthal, September 1960)

Effect of Human Growth Hormone. Daily intramuscular injection of human growth hormone (HGH) in 10 patients stimulated linear growth, produced retention of all cellular constituents measured, increased calcium absorption, and probably mobilized fat. At the dose levels used, the chemical response to HGH waned after 3 to 4 weeks' continuous treatment; responsiveness was restored by 12 days' withdrawal of the hormone. The preparation of HGH was apparently free of significant gonadotropic, thyrotropic, and adrenocorticotrophic contamination, and did not stimulate precipitating or blocking antibodies. (P. Henneman, et al, J Clin Invest, August 1960)



Sigmoidoscopy in Routine Cancer Detection. In a general detection section of a Cancer Clinic, the first 2000 sigmoidoscopic examinations were evaluated: one patient in every 100 satisfactorily examined had a frank carcinoma of the rectosigmoid or a carcinoma in situ of a colonic polyp; 70 cases of benign adenomatous polyps were found. Chemical determinations for fecal blood correlated poorly with clinical findings, while cytologic studies showed good correlation with the presence of carcinoma. The value of routine sigmoidoscopy for early detection of premalignant and malignant lesions of the colon is emphasized. (A. Cameron, et al, Surgery, August 1960)

Relation of Emotional State to Renal Excretion. In 8 patients with compensated congestive heart failure, wide fluctuations in renal excretion of fluid and electrolytes were correlated with mental attitudes and emotions. In situations which evoked feelings of discouragement or tension, renal excretion of water and sodium was decreased. In situations which evoked a reaction of excitement, anger, or apprehension, renal excretion rates of sodium were increased. Diuresis of sodium and water was also associated with periods of reassurance and active relaxation. No significant variation in potassium excretion was noted. The findings suggest that with decreased cardiac reserve prolonged states of tension or depression may be a precipitating factor for an episode of decompensation. A reassuring attitude on the part of the physician may be of substantial importance in therapy of congestive heart failure. (R. Barnes, W. Schottstaedt, Amer J Med, August 1960)

Retinopathy in Malignant Hypertension. From observations of 96 patients, the authors conclude that the effects of treatment on retinopathy and on extraretinal signs of hypertensive vascular disease suggest that antihypertensive drugs control, but do not cure, the underlying vascular disease. (G. Lockhart, et al, Arch Intern Med, August 1960)

Prednisone in Prostatic Hypertrophy. There is no reason to suspect that steroids can reverse the hyperplasia that occurs as prostatic hypertrophy. However, if the severity of symptoms is the result of a superimposed inflammatory congestion, then the steroids should be of value clinically in reducing the symptoms. Of major importance is the fact that these elderly people can tolerate prednisone with relatively few side reactions. (L. Smiley, J Urol, August 1960)

Oral Glutamate in Ammonemia. From studies made on 6 patients with Laennec's cirrhosis—each serving as his own control—the authors concluded that oral administration of sodium glutamate in treatment of ammonia intoxication resulting from blood in the gastrointestinal tract is of no value. (A. Bessman, et al, Gastroenterology, August 1960)

**DENTAL****SECTION**Vitamin Administration in Dental Practice

In modern dentistry, use of caustic substances is decreasing, and their replacement by supplemental administration of vitamins to the regular diet has often been suggested in dental literature.

Vitamin A is necessary for maintenance, regulation, and function of mucosal epithelium. Deprivation of this vitamin leads to atrophy of the epithelial cells and is conducive to susceptibility to local bacterial infections of the oral cavity. Vitamin A deficiency frequently occurs during pregnancy, puberty, menopause, and senescence. Administration of comparatively large doses of the vitamin (100,000 units) has been found beneficial in treatment of leukoplakia of the tongue, lips, inner cheeks, and fauces.

Administration of vitamin B complex obtains cure or, at least, significant improvement in glossitis, stomatitis, pellagra, oral reactions to antibiotic therapy, and periodontal disease. Vitamin B<sub>1</sub> (thiamine), as a supplement to the normal diet (0.5 mg for each 1000 calories of food intake), is a valuable adjunct to treatment of facial paralysis, gingivitis, stomatitis, glossitis, and glossalgia. Vitamin B<sub>2</sub> (riboflavin) has less importance in dental practice than most other members of the vitamin B complex. It may be used in treatment of rhagades at the angle of the mouth, glossitis, burning sensations of the tongue, and erythema associated with geographic tongue.

Nicotinamide plays an important part in prevention and treatment of pellagra in which oral manifestations are significant diagnostic symptoms. Pantothenic acid, another member of the vitamin B complex, provides rapid healing of oral lesions associated with glossitis and cheilosis, and should be used in instances in which administration of other vitamins has proved to be ineffective.

Vitamin C (ascorbic acid), administered in daily doses of 75 mg, has a delaying effect on recurrence of inflammations in the oral cavity. Deficiency of ascorbic acid produces scurvy, pathologic changes in the gingivae, capillary hemorrhage, and loosening of the teeth. Daily doses of 1 gm of ascorbic acid are indicated in treatment of chronic gingivitis, hypertrophic gingivitis (combined with vitamin E), desquamative gingivitis (combined with vitamin A), ulcerative gingivitis, ulcerative stomatitis (combined with pantothenic acid), aphthous stomatitis (combined with pantothenic acid), and epidemic stomatitis (combined with pantothenic acid).



Vitamin D<sub>2</sub> (calciferol) provides an adequate supply of calcium and inorganic phosphorus (phosphate), required during the growth and development periods of children, and for mineral metabolism of pregnant women. This vitamin also counteracts the effects of enamel decalcification.

Vitamin E (alpha, beta, or gamma tocopherol) has proved to be useful in the treatment of periodontal disease, especially periodontosis, because it promotes formation of collagenous and elastic fibers in the periodontium.

Vitamin K<sub>1</sub> (phytonadione) (in U.S. — menadione) in intravenously injected doses of from 15 to 25 mg controls postoperative hemorrhage within 3 hours and produces a normal prothrombin level within 12 hours.

Administration of multivitamin preparations in dental practice may lead to untoward side effects associated with polypharmacy. (K. H. Rinne, Vitamin Administration in Dental Practice: Zahnärztl. Rundschau, January 8, 1960; Dental Abstracts, 5: 466, August 1960)

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#### Infection in Root Canals

This study was undertaken to isolate and identify the microorganisms occurring in the root canals of teeth with infected pulps, with particular reference to comparative results obtained by aerobic and anaerobic methods, and to investigate any possible relationship between bacteriologic, roentgenographic, and clinical conditions of the teeth before treatment.

Cultures were obtained from the root canals of 147 permanent teeth before treatment. The root canals had not previously been exposed. Growth was obtained from 110 (74.8%) of the 147 root canals. Organisms most frequently isolated were streptococci of the alpha and gamma hemolytic types and anaerobic streptococci. A high frequency of isolation of obligate anaerobes was noted. Twenty-five of the 110 positive cultures contained anaerobic organisms only; 50 additional cultures contained both aerobic and anaerobic organisms. There was no apparent correlation between roentgenographic appearance of the periapical tissues and bacteriologic status of the root canal before treatment.

In view of the high incidence of anaerobic organisms, the practice of incubating cultures from root canals aerobically only must be viewed with suspicion.

Rarefaction of bone in the apical region in the absence of demonstrable infection in the root canal appears to be caused by irritation from the products of protein decomposition after death of the pulp. (D. S. Shovelton, D. A. Sidaway, Infection in Root Canals: British Dental Journal, 108:115-118, February 2, 1960)

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### Dental Research at NAMRU No. 3

The current program of Dental Research at Naval Medical Research Unit No. 3, Cairo, Egypt, United Arab Republic, is primarily limited to a project, Biophysical Studies in Dental Disease. The general aim of this study is to obtain by precise physical measurement, data on certain biologic parameters in a population group which has a history of a relatively low incidence of dental caries and rather high incidence of periodontal disease.

Briefly, these data fall into the following categories: (1) Anatomic—Body weight and height as well as depth, breadth, and circumference of various parts is being recorded in order to develop certain anthropometric and cephalometric indices. (2) Compositional—Electrical conductivity and dielectric value of the enamel is being measured as a possible in vivo test for the organic-inorganic ratio. (3) Physiologic—Physiology of mastication is being studied by measuring the amount of light transmitted through interocclusal wax records obtained during various mandibular excursions. A study is also planned wherein the skin resistance of certain selected clinical patients will be measured during various operative procedures. It is believed that these data may be of value in assessing certain sedative premedicants.

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### Short Course in Oral Roentgenology

A short postgraduate course in Oral Roentgenology will be presented at the U.S. Naval Dental School, National Naval Medical Center, Bethesda, Md., 31 October - 4 November 1960. CAPT A. W. Grant DC USN, Head, Roentgenographic Division of the Dental School, will be the instructor.

The course will consist of lectures, demonstrations, and clinical and laboratory exercises. Various types and models of x-ray equipment and techniques used in intraoral and extraoral roentgenology will be considered; film emulsions and their processing will be discussed. Emphasis will be given to safety for both operator and patients. Quotas have been assigned to the 4th, 5th, and 6th Naval Districts, and the Potomac River Naval Command.

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### BUMED INSTRUCTION 6700.16A

24 August 1960

Subj: BuMed controlled items and nonstandard medical and dental material; requisitioning of

This instruction identifies BuMed controlled items at other than BuMed managed activities and indicates (1) justification and Bureau approval required on requisitions for such items, and (2) justification required on all requisitions for nonstandard supplies and equipment.



Personnel and Professional Notes

Dental Graduate and Postgraduate Training. BuMed Instruction 1500.7, 26 August 1960, provides new requirements for part-time outservice training for certain categories of Medical Department training. It is to be emphasized that this directive does not apply to Dental officers who will continue to be guided by BuMed Instruction 1520.2G, 4 August 1960.

CDR Hoerman Perfects Diagnostic Aid. CDR Kirk C. Hoerman DC USN, on duty at the U.S. Naval Medical Research Unit No. 3, Cairo, Egypt, has developed a test capable of predicting the occurrence of the fatal hereditary molecular disease, thalassemia, sometimes known as "Mediterranean anemia."

This disease caused by abnormal hemoglobins may be contracted by natural genetic selection—children whose parents are both carriers will die from this disease at the age of 5 or 6. Detection of the fatal abnormal hemoglobins was accomplished by determining differences in the net charge on the particular molecule in an electrophoretic system.

It had been generally accepted that the hemoglobin in the red blood cell of patients with Mediterranean anemia was the type found in embryonic and fetal life, and that the cause of the anemia was simply a persistence of the genetic mechanism for its production into adult life. Detection based on net charge characteristics was difficult because of the similarity to normal hemoglobin types.

Following discovery of excessively high anion-binding properties of the involved hemoglobin molecules, a method of electrophoresis was developed in which the abnormal hemoglobin of thalassemia was shown to be produced by an independent genetic mechanism. As a result, a simple electrophoretic method evolved which was capable of detecting persons carrying the gene of thalassemia.

RADM Malone Accepts Fulbright Instructorship. RADM Ralph W. Malone DC USN (Ret) has been awarded a Fulbright Grant sponsored by the Office of Educational Exchange, U.S. State Department, to serve as a special lecturer in prosthodontics at the School of Dentistry, University of Cairo, United Arab Republic. ADM Malone served as Assistant Chief of the Bureau of Medicine and Surgery (Dentistry), and Chief, Dental Division of the Bureau from 3 March 1955 to 1 July 1958.

CAPT Rudolph Presents Paper. CAPT C.E. Rudolph Jr., First Dental Company, Camp Pendleton, Calif., presented a paper supplemented with color slides—Reactions of Apical Tissues to Root Canal Therapy—at the 15th Annual Seminar on Oral Medicine, at the Continuation Study Center, University of Minnesota, 23 September 1960.

Dental Corps Exhibit at Pan Pacific Conference. The U. S. Navy Dental Corps exhibit—Casualty Treatment Training Program—will be shown at the 58th Annual Session of the Pan Pacific Dental Conference, Honolulu, Hawaii, 23 - 27 October 1960. CAPT V. J. Niiranen, Force Dental Officer, Fleet Marine Force, Pacific, will monitor the exhibit.

Sangley Point Dental Officers Attend Seminar. Dental officers of the U. S. Naval Station, Sangley Point, P. I., recently attended a seminar commemorating the sixth anniversary of the Dental Service of the Armed Forces of the Philippines, at the headquarters of the Philippine Navy in Manila. CAPT E. K. Etter is Staff Dental Officer at the Naval Station.

LCDR Flagg Presents Lecture. LCDR R. H. Flagg DC USN, U. S. Naval Station, Sangley Point, recently presented a lecture—Endodontics—before the faculty, senior and junior students of the College of Dentistry, University of the Philippines, Manila, at the invitation of Jose D. Rodriguez, Dean of the College.

Dr. Faith Lectures at NDS. Don C. Faith, AB, MA, Ph D, Director of Men's Activities, George Washington University, Washington, D. C., spoke to the Dental officers of the Armed Forces, civilian dentists, and other interested scientific personnel of the Washington area at the U. S. Naval Dental School, 9 September 1960, as a part of the special lecture series of the School. Dr. Faith discussed the art of motivating personnel to work with competence, joy, pride, and enthusiasm.

Dental Officers Participate in ADA Meeting. In addition to Dental officers previously mentioned, CAPT S. Goldhaber, Mare Island Naval Shipyard, Vallejo, Calif., presented an essay—Educating the Patient—as part of a panel on integration of periodontal therapy into everyday dental practice; and CAPT V. J. Niiranen, Force Dental Officer, Fleet Marine Force, Pacific, presented a table clinic—Maxillofacial Prosthetic and Surgical Problems and Their Solutions in the 50th State—at the 101st Annual Session of the American Dental Association, 17 - 20 October 1960, Los Angeles, Calif.

Change of Command at NDC Guam. CAPT Max J. Brandt DC USN recently relieved CAPT J. E. Krieger DC USN as Commanding Officer of the U. S. Naval Dental Clinic, Guam, Marianas Islands. CAPT Brandt reported from the Boston Naval Shipyard. CAPT Krieger was transferred to the retired list of the Navy on 1 October 1960.

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Examples work more forcibly on the mind than precepts.—Fielding



**RESERVE****SECTION**USNR Promotion Policy for Officers

The matter of promotions has been a thorny problem for a number of Reserve officers. This article will clear up some of the confusion over promotion zones and selection opportunities.

What is the Navy's philosophy regarding the promotion of its Reserve officers? What forces shape "selection opportunity"?

First, in discussing selection opportunity—chances for promotion—it is necessary to understand the significance of two key phrases: "old field" and "new field." Officers being considered for the first time for selection to the next higher grade are called "new field." Officers passed over at least once for promotion to the next higher grade, and who are again being considered for selection to that same next higher grade, are called "old field."

The promotion laws for Reserve officers state, in part, that the numbers that may be promoted each year shall be those which the Secretary of the Navy determines to be necessary to provide "equitable opportunity for promotion among succeeding groups of Reserve officers." In addition, the law requires that such numbers provide an adequate continuing strength of Reserve officers in an active status—in short, mobilization requirements must be met.

With these points in view, annual studies are made which examine the current year's "new field" and the "new fields" of the following 4 years. Thus, each officer coming up for promotion for the first time will receive an opportunity which closely approximates that which the preceding year's "new field" officer received and that planned for the "new field" of the next 4 years.

Once an officer's records have been scrutinized by a selection board and the officer has failed of selection in competition with other officers of his year group, he becomes "old field." Members of the "old field" compete for the same numbers as the "new field" but—historically speaking—the percentage of the "old field" eligibles selected each year is significantly smaller than that of the "new field."

By law and policy, the Naval Reserve permits its participating officers above the grade of ensign to remain in an active status for at least 20 years of commissioned service. (The law permits 20 years for LCDRs, 26 years for CDRs, and 30 years for CAPTs.) This combination of law and policy gives the bulk of Reservists an opportunity to qualify for eventual retirement

with pay, provided they make almost every year of commissioned service a year of satisfactory Federal service for retirement purposes. The retention of LTJGs, LTs, and LCDRs until 20 years' commissioned service, CDRs to 26 years, and CAPTs to 30 years, creates sizable "old field" groups over the years.

Misunderstanding of these procedures has, unfortunately, resulted in complaints about "token selections." One sees published reports that 9000 officers were considered for promotion to the next higher grade but only 900 were selected; thus, "only 10%" made the grade. Such figures are misleading. It must be realized that 7000 of these officers had been considered previously and had not been selected. They constituted the "old field." With some 2000 in the "new field" and 900 selected, the opportunity for the "new field" group was 45%.

Equality of promotional opportunity among succeeding year groups of Reserve officers was the Navy's basic touchstone long before the language was incorporated in the Reserve Officer Personnel Act of 1954. Many thousands joined the Navy as Reserve officers during World War II. Today, almost 150,000 officers take part in the Naval Reserve program in some way. "ALNAV promotion"—the promotion of officers by numbers en bloc, without employing quality criteria—was the rule during and immediately following World War II, for both Regular and Reserve officers. As a result, promotion "attrition" was virtually nonexistent.

During the period, September 1946 to January 1949, temporary promotions ceased as peacetime contractions of strength took place. Strategic and tactical concepts of naval warfare were altered by technical progress. Consequently, the number of Naval Reserve officers needed for future mobilization waned.

With resumption of temporary promotions in Fiscal Year 1949, the selection board process was reinstituted (as opposed to over-all group type promotions) and selection attrition was felt for the first time by thousands of officers. For the first time, the "pyramid" loomed as a structural symbol of the Navy's officer corps. Almost every Reserve officer on inactive duty sooner or later encounters the pyramid's restrictive walls. Those who enter at the base of the pyramid will have varying success in rising to its zenith.

The acceptance of this fact has been slow because the bulk of officers were introduced to Navy promotions under the "ALNAV" or group method.

The Naval Reserve exists primarily to provide trained personnel and units for the immediate expansion of the operating Navy upon mobilization for a war or for a national emergency. This mobilization requirement—in the years 1946 to 1949—was twice that of the 1953 to 1957 period, and the requirements for today are less than those of 1957.

These reductions may be attributed to accelerated advancements, improvements in weapons, weapon systems, and the method of weapon delivery. The bulk of today's Reserve "mobilization requirement" is found in the more



junior grades. Although the personnel manning levels of squadrons and ships are immediately expanded during a mobilization, these commands will still have one commanding officer and one executive officer.

When this fact is considered, plus the large number of officers procured during World War II who still take part in Reserve affairs, and the drastically reduced mobilization requirements, it can be appreciated that the Navy has a considerable excess of inactive duty Reserve officers in the more senior grades.

Thus, a Reserve officer promotion policy is formulated by two widely divergent forces: (1) Mobilization requirements, and (2) retention of equitable promotion opportunities in the various grades to provide incentive for sufficient numbers of officers to continue participation in the Reserve program. (The Naval Reservist, August 1960)

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### AVIATION MEDICINE DIVISION



#### Air Crew Equipment Laboratory - Philadelphia

The Air Crew Equipment Laboratory was originated in January 1942 as the Controlled Elements Group of the Aeronautical Materials Laboratory. The group consisted of four engineers and was primarily concerned with the evaluation of oxygen equipment and flight clothing. In November 1943, the Bureau of Aeronautics, upon recommendation of the Bureau of Medicine and Surgery, established the Aero Medical Department as a separate group under the direction of a naval flight surgeon and transferred all personnel and equipment from the Controlled Elements Group to the new department. In August 1946, the Chief of Naval Operations directed that the department be designated the Aero Medical Laboratory. The present name was adopted in January 1954.

The 1960 staff of the laboratory consists of 94 civilian employees and 25 naval personnel. CAPT Roland A. Bosee MSC USN is the present Director of the laboratory; Mr. Lawrence W. Meakin is Technical Director.

The mission of the laboratory is: The Air Crew Equipment Laboratory, under the administrative and technical control of the Bureau of Naval Weapons and, in matters of aviation medical research, under the technical direction of the Bureau of Medicine and Surgery, shall function in the following manner:

1. Conduct applied engineering research, design, development, test and operational evaluation of naval aircrewmembers and spacecrewmembers, and personal and safety equipment previously established as a requirement by the Chief, Bureau of Naval Weapons. The engineering developments shall be in concert with known or experimentally defined biologic, psychologic, and human engineering concepts to insure total bio-engineering integrity of the equipments. The laboratory shall also recommend rules and policies concerning health hazards incident to the use of these equipments in air operations for further promulgation by the Bureau of Naval Weapons.

2. Conduct basic and applied research in the biologic, psychologic, and human engineering aspects of aviation medicine as it pertains to the personal and safety equipment of naval aircrewmembers and spacecrewmembers and to their ability to perform satisfactorily under all stresses of their environment.

3. Engage in engineering and biologic research and development in fields of aircraft nuclear propulsion and space and orbital flight in anticipation of future aircrew or spacecrew equipment requirements as projected trends in naval aviation and astronautics become apparent.

The scientific organization of the laboratory consists of the following divisions: Safety and Survival Equipment Research and Development; Escape and Crash Safety Research and Development; and Life Sciences Research.

Mr. Edward L. Hays, Mr. Chris T. Koochember, and Dr. Edwin Hendler, respectively, direct these divisions.

The physical plant occupies 130,000 square feet with an estimated value of \$5,600,000. Outstanding facilities are:

1. Three personnel type altitude chambers. The combination provides capability for simulating altitudes of 100,000 ft, temperatures of +280 F to -70 F, explosive decompression times of 0.050 seconds, and control of relative humidity. In addition to handling personnel, specimens 8 ft in diameter by 28 ft in length can be handled. The altitude/thermal/decompression chamber which is part of the complex is capable of space and orbital environmental simulation with respect to altitude, temperature, and air quality and quantity.

- \*2. Ejection Seat Test Tower, 150 ft high and capable of ejecting weights up to 600 lbs for human and equipment investigations.

- \*\*3. Bio-astronautics Test Facility, permits confinement and isolation of 1 to 6 volunteers under simulated space capsule conditions for indefinite time periods at any simulated altitude from sea level to 100,000 ft. Unique systems for oxygen production reclamation and air purification are incorporated. Complete feeding, sanitary, and sleeping facilities, and simulated work consoles are provided.

- \*\*4. Vertical Accelerator (drop tower), 141 ft high; platform size 8-1/2 by 8-1/2 ft; capable of giving accelerations commensurate with peak dynamic loadings of 80,000 lbs. (This device is contracted for and should be available in approximately 6 months.)



5. Underwater Test Facility (in process of completion), 32 ft diameter by 30 ft deep; capacity adequate for evaluation of emergency escape systems for static and drop firing for simulation of escape from sinking aircraft or spacecraft.

\*\*6. Four equipment altitude chambers. The combination provides capability for simulating an altitude of 200,000 ft and temperatures of +250 F to -140 F. Maximum interior dimensions 40 in x 40 in.

\*\*7. Flexible Cockpit Test Device capable of simulating or developing any aircrew work space by permitting spatial location of any work console complex.

\*\*8. Complete liquid oxygen laboratory equipped with an oxygen bomb test chamber.

\*\*9. Linear Accelerator for crash and crew restraint programs capable of accelerating 2000 lbs, up to 43 g's. The maximum sled velocity is 140 ft per second.

\*\*10. Escape System Recovery Net capable of recovering ejected free flight seats and capsules fired from fixed jigs. Maximum weight capacity is 500 lbs.

\*\*11. Vertical Accelerator for equipment evaluation, acceleration range 10 g to 200 g, maximum weight capacity 75 lbs.

\*\*12. Ejection Seat and Components Environmental Simulator designed to subject aircraft ejection seat systems to heat, cold, sand, and dust prior to ejection into recovery net.

13. Personnel Cold Chamber capable of -100 F; interior dimensions 18 ft x 26 ft x 10 ft high.

14. Weather Room capable of temperatures of +50 F to +180 F, and relative humidity of 5 to 95%; interior dimensions 21 ft x 23 ft x 13 ft high.

15. Electrostatic shielded enclosure for extremely accurate biophysical measurements.

16. Acoustic chamber for additional biophysical measurements and to investigate sound attenuating properties of protective helmets, et cetera.

17. Two equipment centrifuges (g accelerators). The combination provides a 100 lb maximum capacity at 20 g's and 26 lbs to 75 g's. Maximum test specimen size 24 in x 24 in x 18 in.

18. Ozone and humidity test cabinet capable of meeting existing military environmental testing specifications.

The outstanding accomplishments of the Air Crew Equipment Laboratory are the result of the efforts of a staff of professional and scientific personnel and technicians with many years of training and experience in a highly specialized field. The staff includes three Doctors of Medicine, four Doctors of Philosophy, two masters of Science, and thirty-seven persons with Bachelor of Science degrees. The professional training encompasses several engineering disciplines, physiology, psychology, physics, and various technologies. Several patents have been issued to ACEL personnel. Approximately twenty papers are published in scientific and technical journals each year.

The MK IV full pressure suit system has been developed in cooperation with industrial sources and is being utilized in the F8U, F4H, A3J, and other high performance weapons systems. A modified full pressure suit system has been developed in cooperation with industrial sources and has been accepted by the National Aeronautics and Space Administration (NASA) for use by the Project Mercury Astronauts.

Aircraft emergency escape systems with ground level capability have been developed. Criteria for underwater escape from aircraft are being developed. Trajectory patterns and design criteria and evaluation methods for ejection seat escape systems developed in ACEL have been adopted by industry.

Advanced design constant-wear and quick-don-type antiexposure suit systems have been developed and are being placed into fleet use. In cooperation with other government agencies, work to determine the effect of high thermal pulses on various materials for special weapons protective clothing has been coordinated. Prototype special aircrew protective systems have been developed using these materials.

Research and development efforts have resulted in high efficiency liquid oxygen recharging techniques and high-performance, low-weight oxygen regulators.

Confinement and long term habitability investigations for 7 and 8-day durations have been conducted. Prototype closed circuit ecologic systems were developed and operated during the last of these studies. In cooperation with industrial sources, high efficiency chemical oxygen and air purification systems for application in closed circuit ecologic systems are being developed.

Improved protective helmets have been designed and developed in conjunction with industrial sources for carrier, patrol, and helicopter pilots and for flight deck personnel. Basic investigations are being conducted on the performance data of protective helmets with respect to pressure distribution and alteration of the impulse of the crash load.

Human engineering concepts for aircraft controls and interior and exterior lighting of aircraft have been developed. Research leading to the establishment of specifications for high visibility, anti-collision color schemes for aircraft has been conducted.

Fundamental data, such as tolerable dead air space in oxygen breathing systems, effects of prolonged breathing of oxygen, optimum quantity and temperature of ventilation air for impermeable protective systems, such as anti-exposure and full pressure suit systems, have been gathered for the design of crew safety and survival equipment systems. In addition, flight crew proficiency, as it is effected by use of special crew protective and survival systems, is being investigated on a continuing basis.

Investigation of unsatisfactory reports, and other deficiencies and failures in issued safety and survival equipment is being conducted on a



continuing basis. Aviation Safety and Survival Equipment Bulletins are being prepared to alleviate and solve the problems. (CAPT R.A. Bosee MSC USN, Director, Air Crew Equipment Laboratory, Naval Air Material Center, Philadelphia, Pa.)

Footnotes: pages 32 and 33

\* No comparable facility available in any other service or in industry.

\*\* Only naval facility currently available incorporating over-all capability.

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### Tissue Doses in Proton Radiation Fields in Space

Van Allen's discovery of a belt of high intensity proton radiation girdling the earth at extreme altitudes in the equatorial region has focused attention on a new type of radiation hazard awaiting man as he sets out to fly into outer space. In the presatellite era it was generally believed that radiation effects on man in extra-atmospheric and space flight would be essentially limited to the "microbeams" of heavy nuclei and narrow meson cones. As to the destructiveness of these events in living tissue, the general consensus was that damage, while negligible for short exposures, would develop for extended exposures—slowly and inconspicuously, similar to damage from so-called low-dosage long-term irradiation. That means it would manifest itself in such unspecific effects as shortening of mean life span and increased mean incidence rate of malignancy, both identifiable only statistically. These assumptions are no longer tenable in the light of new information. Now, there is little doubt that the ionization dosage—at least in certain regions of cis-lunar space—reaches the level of acute radiation injury.

Actually, the Van Allen Belt is by no means the only high intensity proton radiation field in space. Similar fields have been observed within and in the vicinity of auroral displays. In fact, after a large solar flare, the entire interplanetary medium seems to be filled with an extremely powerful proton radiation. Wherever these proton beams interact with magnetic fields—be it the solar or telluric field, the galactic field, or fields created by the turbulent motion of the proton plasma itself—deflecting, focusing, and accelerating forces come into play which produce additional large local and temporal changes of the intensity.

It is a characteristic feature of solar proton beams in space that the flux shows local and temporal variations over a truly tremendous range not only with regard to the total particle intensity, but also with regard to the relative shares of particles of different energies. Since the energy directly determines the penetrating power, it is seen that for a meaningful radiobiologic evaluation, one must not satisfy oneself with a determination of what, in "terrestrial" terminology, would be called the "air"

dose, but must proceed to a quantitative analysis of the intratarget dosage distribution.

Two counterparts of spectral types are the proton beams in the Van Allen Belt and the transitory beam observed after the large solar flare of 10 May 1959. How profoundly different the penetrating power of these spectra really is becomes evident if actual tissue depth doses are analyzed for a target the size of the human body. The table shows these depth doses for two proton beams for three different prefiltration thicknesses. The data illustrate the complexity with which the radiobiologist is confronted if he is to give a general appraisal of the total body radiation burden and to specify shielding thicknesses.

Depth Dose in Percentage of Skin Dose for a Spherical  
Tissue Phantom of 75 Kg Weight

<u>Type of Radiation</u>	<u>Prefiltration</u>		
	<u>2 g/cm<sup>2</sup></u>	<u>4 g/cm<sup>2</sup></u>	<u>8 g/cm<sup>2</sup></u>
Flare produced radiation	0.6%	2.9%	10%
Radiation of inner Van Allen Belt	42.0%	51.0%	64%

The intricacy of pertinent relationships is best demonstrated in a concrete example. If an astronaut is visualized in a capsule protected by a vehicle wall of 3/4 in of aluminum flying through the lower fringes of the Van Allen Belt, the lenses of his eyes are protected by an additional 3.5 mm of tissue (aqueous, cornea, tear fluid). This additional filtration reduces the dose to the lens to about 94.5% of the skin dose inside the ship. By closing his eyes, the man could further reduce the dose to the lens to 93%, and by squeezing the eyes to about 90%. In an auroral proton field under the same conditions the corresponding figures are 67%, 59%, and 47%, respectively. It is obvious that in the first case, i. e., in the Van Allen Belt, closing the eyes and squeezing is not of much advantage, whereas in the auroral radiation field a substantial reduction of the radiation load on the lens would be accomplished.

The foregoing discussion shows that assuring radiation safety in space flight is a problem of its own. It is no longer limited to keeping the total body radiation burden within permissible limits, but requires special safeguards lest an objectionably high surface dose remains hidden behind an apparently safe total body dose. The picture is further complicated by the fact that the measurements would have to be integrated with a determination of the beta and gamma doses from electrons and photons which probably in



all cases accompany the proton flux. Since the near future is likely to augment greatly our knowledge of these phenomena from recordings of satellites and deep space probes now in orbit, a more specific discussion should be deferred until this information is available. (H. J. Schaefer, U.S. Naval School of Aviation Medicine, Pensacola, Fla.)

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#### Aviation Medicine Residents

Paragraphs 4a and 4b of BuMed Instruction 6410.3, Aviation Medicine Residency Quarterly Report, NavMed-1326 (Reports Control Symbol MED-6410-4), are presented for information and action as necessary.

4a. Candidates for or Residents in Aviation Medicine. All such doctors are responsible for filling out the subject report at the end of each quarter of the year and forwarding it to the Bureau of Medicine and Surgery via both their preceptor and the Naval School of Aviation Medicine, Naval Aviation Medical Center, Pensacola, Fla.

4b. Designated Preceptor. A preceptor will be designated for each candidate by the Bureau of Medicine and Surgery upon written request by the individual concerned. The preceptor must maintain adequate contact with and guidance for his candidate throughout his assignment and properly endorse the appropriate space on the reporting form.

In many instances, the Aviation Medicine Residency Quarterly Report, NavMed-1326, is being forwarded from individuals in the field to the Chief, Bureau of Medicine and Surgery via the Naval School of Aviation Medicine without going through the preceptor of the individual concerned.

It is considered that if the quarterly reports are not completed correctly, individuals concerned will probably be greatly disappointed if they do not receive credit for submitting reports concerning the work they have accomplished.

\* \* \* \* \*

#### Aviation Magazine Discontinued

It is deeply regretted that "Contact" must come to an end in its 20th year of publication.

Since its beginning in 1941, the annual publication of this journal has been eagerly anticipated by medical personnel working in the fields of aviation and space medicine as well as alumni now in civilian life. It will be keenly missed by all.

Authorities have found the magazine in conflict with the provisions set forth in SecNav Instruction 5600.12.

### Photographs and Sketches

During the past year and a half there have been several Medical Officer Reports received from the field with unnecessary photographs enclosed. These photographs served no useful purpose in that they did not correlate pathologic factors helpful in detailed reconstruction and analyses of aircraft accidents.

Paragraph 42c(3), Section F of OpNav Instruction 3750.6D is quoted in part for information and compliance:

(3) Photographs and Sketches

(a) Photographs and diagrams are helpful in reconstructing and analyzing aircraft accidents. The types of photographs and diagrams desired are those showing failed parts, misused controls, flight path prior to the accident, photographs of the aircraft after the accident, et cetera. All photographs and diagrams are to be captioned with explanations on the print side. Photographs of a classified nature are not to be enclosed unless a definite contribution to the analysis would otherwise be lost. Photographs of the deceased are to be enclosed only with the original MOR which is forwarded to the Naval Aviation Safety Center. Where pathologic factors can clearly be correlated with the use of controls, difficulties in escape, human engineering features, et cetera, the submission of simple anatomical sketches are encouraged.

Flight Surgeons must keep in mind that when the original and copies of the Aircraft Accident Report proceed through the chain of command, these photographs are viewed by many individuals whose interest in pathology due to trauma, fire, chemicals, et cetera, is totally lacking.

Seriously consider the value of photographs of fatalities before forwarding them as enclosures.

\* \* \* \* \*



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(Continued on page 40)

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